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10/579,468

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04/22/2008

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EXAMINER

BEHM, HARRY RAYMOND

ART UNIT

PAPER NUMBER

2838

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                                      |                                      |  |
|------------------------------|--------------------------------------|--------------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/579,468 | <b>Applicant(s)</b><br>EGUCHI ET AL. |  |
|                              | <b>Examiner</b><br>HARRY BEHM        | <b>Art Unit</b><br>2838              |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 May 0506 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. ____.                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>5/15/06 and 10/2/06</u> .                                     | 6) <input type="checkbox"/> Other: ____.                          |

## **DETAILED ACTION**

### ***Specification***

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

A title, such as A DC-DC converter with resonant current detection, is suggested.

### ***Drawings***

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the LC resonant circuit in series with said primary switching means, as in Claim 1, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jang (US 6,934,167) in view of Meins (US 6,515,878).

With respect to Claim 3, Jang discloses a bi-directional DC-DC converter comprising:

a transformer (Fig. 5 TR) having primary side terminals [connections to Vs], secondary side terminals [connections to Vo], a primary side winding (Fig. 5 Np), and a secondary side winding (Fig. 5 Ns) and determining a voltage converting ratio (Fig. 5 n);

a primary side pair of switching means (Fig. 5 SH,SL) interposed between said primary side terminals and said primary side winding; a

secondary side pair of switching means (Fig. 5 S1,S2) interposed between said secondary side terminals and said secondary side winding;

a primary side rectifying element [antiparallel diode] connected in parallel with each of switching elements in said primary side pair of switching means;

a secondary side rectifying element [anti-parallel diode] connected in parallel with each of switching elements in said secondary side pair of switching means; and

a driving means (Fig. 4 Primary-Current Feedback Frequency Control, PWM Output Voltage Feedback Control) for turning ON/OFF the switching elements in said primary side pair of switching means (Fig. 4 SH,SL) and the switching elements in said secondary side pair of switching means (Fig. 4 S1,S2), wherein: a LC resonant circuit (Fig. 5 Ls,Cs) is interposed between said secondary side winding and said secondary side pair of switching means;

a resonant frequency detecting means (Fig. 4 Primary Current Feedback) for detecting a resonant frequency caused by an operation of said LC resonant circuit and means for feeding a detected output of said resonant current detecting means back to said driving means (Fig. 4 Primary-Current Feedback Frequency Control) are provided; and

said driving means turns said switching means ON/OFF at a frequency of said based on the frequency detected by said resonant frequency detecting means (Fig. 4 Primary-Current Feedback Frequency Control).

Jang does not disclose wherein the primary side is low voltage and the secondary side is high voltage. It would have been obvious to one of ordinary skill in the art at the time of the invention to implement the turns ration (Fig. 5 n) such that  $N_p < N_s$ . The reason for doing so is to boost the output voltage.

Jang discloses controlling the switching frequency to be slightly higher than the resonant frequency, not necessarily at the resonant frequency. Meins discloses

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switching (Fig. 8 primary voltage 630) at the same frequency as the secondary resonant current (Fig. 8 636). It would have been obvious to one of ordinary skill in the art at the time of the invention to switch at the resonant frequency. The reason for doing so is to achieve "high efficiency and ability to transfer large quantities of power, and a stable resonant frequency unaffected by load conditions", (Meins column 10, lines 40-43).

With respect to Claims 1 and 2, Jang in view of Meins discloses a DC-DC converter as set forth above. See claim 3 for additional details.

With respect to Claim 4, Jang in view of Meins discloses a DC-DC converter wherein a LC resonant circuit (Jang Fig. 5 Ls,Cs or Meins Fig. 30 secondary input converter) is interposed between the secondary high-voltage winding and secondary switching means.

With respect to Claim 5, Jang in view of Meins discloses the DC-DC converter as set forth above. Jang does not disclose wherein the primary side switches are a full bridge. Meins teaches a bi-directional converter where the primary switches (Fig. 30 108-111) and secondary switches (Fig. 30 secondary input converter) are configured as four switching elements in a bridge. It would have been obvious to one of ordinary skill in the art at the time of the invention to implement the primary and secondary switches as four switching elements in a bridge. The reason for doing so is to provide reverse power control from the active DC load to the primary input.

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-5 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3 and 5 of copending Application No. 10/581,916. Although the conflicting claims are not identical, they are not patentably distinct from each other because it would have been obvious to a person having ordinary skill in the art to use a resonant current detecting means to detect a resonant frequency in a DC-DC converter, since it is well known to use a current sensor to detect a frequency.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HARRY BEHM whose telephone number is (571)272-8929. The examiner can normally be reached on 7:00 am - 3:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Akm E. Ullah can be reached on (571) 272-2361. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Harry Behm/  
Examiner, Art Unit 2838

/Jeffrey L. Sterrett/  
Primary Examiner, Art Unit 2838